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BARBARIAN ARCHITECTURE IN MORAVIA DURING THE FIRST CENTURIES AD - BUILDING MATERIALS, CONSTRUCTIONS AND GROUNDPLAN LAYOUT

ARCHITEKTURA BARBARŮ NA MORAVĚ V PRVNÍCH STALETÍCH NAŠEHO LETOPOČTU - STAVEBNÍ MATERIÁLY, KONSTRUKCE A PŮDORYSNÉ DISPOZICE

Abstract

The article presents buildings representing architecture of the barbarian populations, which during the 1st-3rd century AD inhabited area of Moravia (Czech Republic) lying north of the Roman border on the Middle Danube. During archaeological excavations there were documented structures founded at the ground level, with pillars digged into the ground. There were used wooden structures with supporting elements in the form of stakes staffed in the ground, the walls were built using wicker and clay. There are known forms of large dimensions, but also small utility constructions. The surprising finding is fact, that when assessing the seemingly primitive recessed structures there were implemented measuring procedures requiring good knowledge of geometry and abillity to stake of right angles can be expected.

Keywords

Moravia, Roman period, Barbarians structures, building foundations, geometry

1 INTRODUCTION

The architecture of the first century AD is represented by buildings that were built on the territories controlled by Rome. The world of barbarians living on the northern borders of the Roman Empire in ancient times is considered quite primitive, and the creators of the reliefs on the column of Marcus Aurelius (Fig. 1), in the framework of depictions illustrating recent fightings of Marcomannic wars, not looking for details about the realities of the countries located on the north of the Danube used the shelters of shepherds from the mountain areas of the Apennine peninsula as a model for demonstrating the homes of local residents, see e.g. [19].

The architecture of barbarians inhabiting the territory of Western and Central Europe beyond the Roman borders is based on the older, prehistoric traditions and did not know the walling on mortar. As basic building materials wood and clay were used. The terrain archaeological excavations only on a small scale provide information about technological and construction aspects of buildings of that time. There are preserved only small remnants of those buildings in terrain. In the framework of archaeological research an interest is usually reduced to solving problems of typology relevant to time classifing features, or the details are studied which can provide support for the determination of the former functions.

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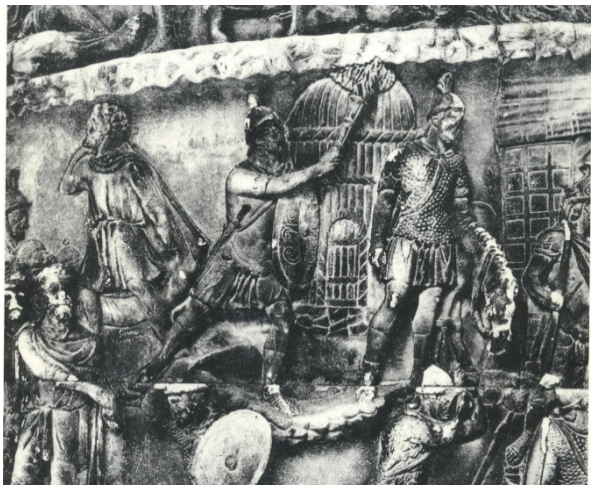

Fig. 1: The building destroyed by Roman soldiers attack against a barbarian village during the Marcomannic wars. The scene from a column of Marcus Aurelius on Piazza Colonna in Rome [13].

Knowledge about settlements and settlement complexes can be used in the analysis of contemporary social structures, the intensity of settlement in the context of the natural conditions of the period is usually also monitored. Attempts on reconstruction, either mass or drawing, are often prepared as an illustration approaching the appearance of creations of studied time period, generally only with intuitive consideration of technical problems. There are rarely observed aspects of building structures usually in situations where there is significant theoretical training important for construction works at the archaeological parks (for Roman period e.g. Elsarn in Austria [10]. Technical details of construction or statics issues are solved only in exceptional cases [8], [15].

2 DATA ACQUIRED DURING THE FIELDWORKS

The crucial part of the settlement features from the Roman period researched in Moravia belongs to a period that includes the period of the second half of the 1st century AD, the 2nd century AD and also the beginning of the 3rd century. Then there were used mainly areas situated in the Moravian ravines, with a concentration of population along major rivers Morava and Thaya. Settlements were situated explicitly in places with good microclimate, preference was given to south-facing slopes. At first river terraces during archaeological surveys can identify traces of human settlements in areas in a distance of only 2 - 6 km. Also valleys of minor rivers and exceptionally headwater basin were used; to the hills and uplands within the border mountains settlement did not arrive. Our area of interest at that time constituted an integral part of an extensive ecumene including lowland areas in the Česká kotlina, Danube part of Lower Austria and southwestern Slovakia; according to historical reports it can be expected that the local population belonged to Germanic tribes of Markomanni and Quadi.

In the sites of settlements on the loess or gravel-sand subgrade, during archaeological fieldworks there are traces revealed of building activities in the form of countersinks, other manifestations of construction are postholes. They are an indication of the former above-ground wooden structures. The wooden posts, usually from carpenter unworked logs (with diameters of about 15 cm) were placed within slightly larger cylindrical pits, the free space around the foot of the wooden element was then tamped by clay.

Leaving aside the technical facilities and more often closer indefinable features (for example, storage pits, food ovens, pottery ovens, various settlement pits, clay pits or iron devices) clumps and whole systems of postholes appear in the researched areas. They indicate the points where the so called aboveground constructions with floors at the level of the former field were found. The entire

plans can be watched only in exceptional cases, and usually there are not any signs available of internal division or equipment in the form of fire pits, also missing even the so called cultural layers - clay horizons and runoff mingled with waste materials produced during the people´s stay in the settled areas.

The part of the housing consists of sunken features, mostly represented by the so-called huts (see below). Even in these buildings, we can watch the layout of vertical support elements according to the layout of the postholes. Positive evidence of exterior walls or partitions *in situ* is available only very rarely. In the places where there were wooden constructions destroyed byr fire, ash, embers and burned clay appear, lumps of daub are frequent and clay blocks of erasures with bold imprints wooden elements, too.

The arrangement of settlements is not sufficiently known, except for an unsystematic layout of features creating free parallel rows with a watercourse, traces of the existence of smaller clusters appear. Good defensible positions were not used and we miss clear traces of the fence. Small units, such as courts, can be expected only in younger Roman period, according to the situations known in other regions [4]. We have no information available that would allow us to distinguish the residence of members of the nobility. Grave findings demonstrate that in the areas used by them products made from precious metals, sumptuous gifts received during diplomatic efforts with representatives of the Roman Empire, or features used at social events organized by representatives of the barbarian communities, e.g. services of bronze boilers, iron tripods or large trestles intended to cook large pieces of meat were stored often probably even for several generations [12].

3 ABOVEGROUND BUILDINGS

Sufficiently readable plans of aboveground structures in Moravia are preserved only in exceptional cases, and only rarely we are able to watch their relations to other types of features in the populated area. Only during the research in Vyškov (1989-1991, head PhDr. Martin Geisler) it could be managed to watch an important part of a large complex - there was an investigated slope with settlements forming a band with a length of 500 m, and only the rest of the area 300 m long remains unknown. Therefore, to characterize Barbarian architecture in the role of *pars pro toto* we will primarily use examples from this site. Research actions in other parts of the Moravian territory (e.g. Blučina, Komořany, Křepice, Mušov, Rajhrad [3] [17]; allow to study relatively small snippets of the settled areas. In the western part of the barbarian Europe the aboveground structures are extremely numerous. The condition noted in Moravia corresponds to the situation in the southwestern Slovakia and in Bohemia (primarily [4], [6], [20].

In Vyškov we have a significant part of the the ground plan of a big construction available which is additionally interesting because it had its shorter side adjusted to an apse (Fig. 2: 2). The part of the built-up area has not been maintained, because we lack the data needed for comparison to features from areas where numerous potential analogies are available. The most significant exhibit houses (ie. „Wohnstallhauses“), which were key buildings in settlements, are situated along the banks of the North Sea. The common roof covered the living area equipped with a fireplace, in the middle there was a space for the storage of things and operation of production activities, the rest was used to house animals - there was found a special space for each cattle. The freestanding farm buildings were also usually of a large size. Similar structures are known from throughout the western barbaricum [2], [5], [18], [22].

When constructing the building with an apse from Vyškov it was necessary to cover the space with a span of about 6 m, while the roof truss was supported evidently by the inner row of stakes; they took place near the outer rows, and so we cannot label the known torso as the rest of the aisled disposition. Total length is unknown, in case of missing one third or even one half the longitudinal dimension could be 17 or maybe 22 m. It can be surmised that during the construction of this building challenging construction techniques were used, including carpentry of structural joints (eg. linkage of pins, plateful); they are supported by findings of treated wood fetched from humid environment at the site Feddersen Wierde in northern Germany [9].

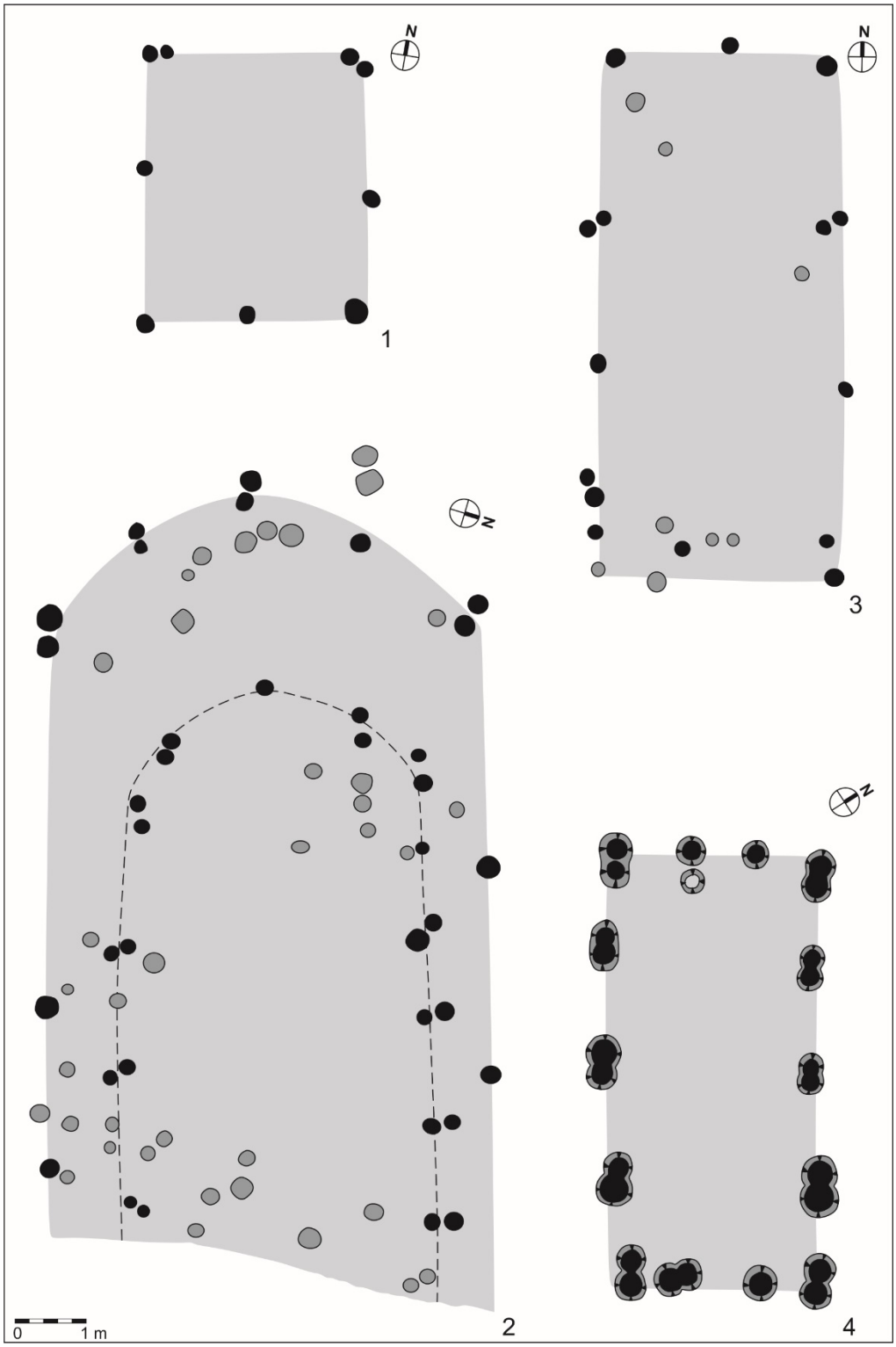

Fig. 2: Aboveground constructions from Vyškov. 1. Granary (feature 209) with 3 pairs of vertical supports. 2. Building with an apse. 3. Rectangular ground plan (complex near feature 219) with shallow postholes. 4. Plan of the building (feature 124) characterized by deep postholes.

For the determination of the former function of the building we observed in Vyškov we have no supports, putting into the space of recessed huts could possibly allow to consider that the interior was used for dwelling, the economic function which is not precisely known cannot be excluded as well. Rounding of the shorter side, this time in the form of a segmented closure is documented for the building investigated in the Austrian Bernhadsthal. Building area there could be watched in its entirety, there were dimensions 10,70 x 5,80 m identified. Considered is the possibility that one part was used for housing and in other parts there was a space found for stabling of cattle – it could probably belong to the category of "Wohnstallhaus" [10].

Other groups of postholes (feature 209) illustrated the existence of a granary in Vyškov (Fig. 2: 1). An area with dimensions of 380 x 320 cm is defined by three pairs of postholes which are on one of the short sides doubled. Granaries with floor plans (usually) of small dimensions in the western part of the territory inhabited by Germanic tribes existed in the local Iron Age. The popularity was given by natural conditions with a high state of groundwater in inhabited landscape - the elevated floors allowed to keep stocks dry. Numerous examples of these buildings were reported at other locations in Moravia, in Vlčnov - Dolní Němčí or in a late Roman period settlement Zlechov [3], [21].

The system of postholes (complex near feature 219) allows to reconstruct ground plan of another aboveground feature that had a rectangular shape (Fig. 2: 3), with dimensions of 720 x 340 cm. Lines formed by postholes are not arranged in alignment, it seems that the top of stakes have not linked a single wall plate with a direct course. The stake in the middle of one of the parties could keep the end of the ridge purlin of the gabled roof. Doubling of some vertical elements allows the considerations that they were incorporated during the construction of the walls, during their establishment wooden poles and clay were used, but we miss more detailed evidence for such a proposal.

Another structure (feature 124) with dimensions of 640 x 340 cm is characterized by the fact that in both long sides and partly at one shorter side postholes arranged in pairs appeared (Fig. 2: 4). They intervened to great depths (some up to 60 cm above the level of detection). Similar distribution of postholes was not already repeated in Vyskov and at the settlements north of the middle Danube it appears exceptionally; doubling of stakes is observed in the building from Bernhardsthal (see above).

Both these elongated buildings from Vyškov (Fig. 2: 3, 4) are showing signs according to which for measuring of their long and short walls there was used knowledge necessary for the determination of right angles. Deliberate layout of the right angle was clearly documented for Celtic architecture during detailed analyzes of buildings from oppidum Manching in southern Germany; there was also used a local furlong (foot). The side lengths of underground structures were also projected in standardized ratios in this area (1: 2, 3: 4, 3: 6, 4: 6, 7: 8, 7: 12, etc.) [14]. We can expect predetermined intention of the builders from the Roman period in our monitored cases. Despite the fact that the presented plans show different ways of establishing the supporting elements, for both is true that a built-up area created a rectangle with aspect ratios of 2: 1.

3.1 Daub

In the case of our analyzed aboveground structures from Vyškov we have not evidence for the reconstruction of the former appearance of the exterior walls. We can only expect in a general level that the techniques of clay deletion applied to the mesh from bars and twigs were utilized; The armature from such materials could also firm up a strong clay wall, which sometimes was built of a material mixed with organic filler material (probably straw, chaff or hay). Daub fragments analysis from the sites which were destroyed by fire, demonstrate such procedures, in some cases (Slatinice in the Central Moravia) with the connection of the analyzed burned fragments to the concrete construction [6]. In the form of imprints also different ways of adjustments of wooden support and construction elements are recorded. Round timber of various diameters was used, burning and stinging of trunks or carpentry processing into prisms is also documented.

For building with a pair of postholes around the perimeter of the ground plan (feature 124; Fig. 2: 4) there is an obvious effort of builders to perform a solid foundation of the feet of the stakes

in the ground - they encroached up to depths approximately 60 cm from the level of detection. It is possible to assume that the construction was chosen in order to be able to carry a higher load. An interest to place the pairs of stakes in a line of longer walls at regular intervals is obvious. So their tops could be linked with the aid of horizontal beams running across the feature. One can assume that these beams created a grid allowing to make ceiling of the inside. In the case that the wooden supporting elements were overlaid by deletion or by a layer of clay, they could create a barrier increasing heat insulation properties of such a construction and at the same time the interior of the building would have been better protected against the effects of fire in case of fire.

4 COUNTERSINK HUTS

For Moravia and the adjacent area (southwest Slovakia, Danubian part of Lower Austria, Bohemia) countersink huts with quadratic ground plans are characteristic for the Roman period, with stakes distributed at the vertices of a hexagon. Other types of buildings with floors under the ground level are represented in insignificant numbers. There has not been possible still to decide whether they were intended for habitation or for the performance of economic activities. There was no installation of any fireplace or other heating equipment in them. The question is also why the scheme with six stakes, without supporting elements mounted in the corners was used; this solution has not any analogy in the prehistoric times and remains totally unique. In the specialist literature typology is monitored and details observed during fieldworks are documented circumstantially [3], [7].

The adequate feature are usually shallowly recessed or their floors are lying in depths about 60 cm above the level of detection. The entry is often characterized by a special niche for which the so called the input dent is usually found in the floor. As a representative example we can mention basic information for the sunken hut from Vyškov, feature no. 50 (Fig. 3) [16].

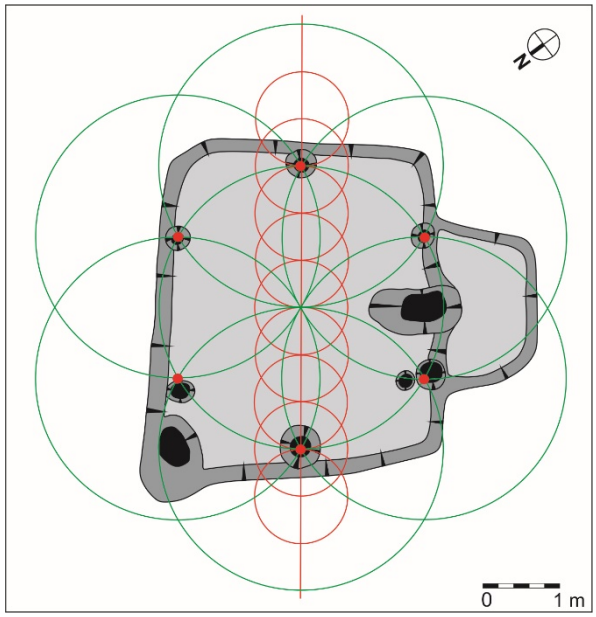

Fig. 3: Ground plan showing the scheme, which was used for the measurement of the positions for individual postholes at the beginning of construction works. Vyškov, sunken hut, feature no. 50.

The recessed part occupied an area with dimensions 340 x 410 cm (Fig. 3), the floor was found at a depth of 40 cm. One of the postholes located in the middle of the short northeast side reached up to 70 cm depth, we expect that together with the shaft in the opposite wall it carried the ridge pole. The interior with a flat, hard (apparently trampled) floor was accessible through an entrance alcove with a slightly increased floor, a shallow dimple was found near. In one of the

corners a „shallow cellar“ was modelled. The total area reached 14 m^2, while on the settlement also a hut is noted with an area of just 10 m^2, the largest acreage reaches up to 30 m^2.

There are certain indications for monitoring of digging the hut. In Miroslav narrow strips were detected created probably by a hoe with a flat blade, from Vyškov we know traces of clay extracting with a tool, which can be reconstructed as a stake with its forehead truncated into a narrow strip with a blade in the form of a widely flared wedge. Loose clay then was carried away in baskets. The tool in the form of a stake was suitable for digging of relatively narrow postholes.

The quantity of mass fetched from the space of the building 50 in Vyškov reached about 5,5 m^3, due to the fact that during the fieldworks overburders of higher levels occurred it could have been slightly more of excavated material. Ditched clay (loess) was probably used for the construction of a massive exterior wall. Such an assumption is supported by the situation documented in the area of another hut from Vyškov (feature 217). Around the countersink proper a strip of small postholes was conducted in places 60 cm wide; the rods in the holes created an outline for a weave, which featured a support for a clay wall.

The material obtained by mining in the area of the hut (feature 50) could have been sufficient for the construction of a wall with a height about 120 cm, and with a thickness at least 35 cm. The reason for the construction of such mighty walls can be found in the fact that the part of weight of the roof structure consisted on the wall. The wall, as well as the countersink below ground level were important for reducing of heat losses in winter. This was achieved also for better accumulation of heat in the interior. Conversely, thermal inertia in the summer, together with the evaporation of soil moisture caused that there was no excessive heating.

Recurring elements in ground plans led the authors of this text to try to verify whether a unified plan was applied during the construction of huts. In the first instance, on the example of the feature 50 from Vyškov (Fig. 3) it was found that all the six postholes were located quite accurately on a circle with the center on the axis of the feature, between the postholes in the short sides. Places for the stakes are located at intersections formed during dividing the circle into six equal parts (Mistakes can be explained by the fact that during the excavation of the specific posthole a deviation of the shaft from the vertical direction occurred; in addition, surveying was carried out in the uneven terrain on the slope.). We can also say that an abscissa defined by centers of postholes in the shorter walls can be divided into 12 parts. Measuring of points in the terrain hypothetically was carried out so that the builders used a rope marked with multiples or parts of some standard line measure. Then in individual steps they measured points in a predetermined scheme with its help.

It is not clear why they created so complicated ground plan. All the appropriate steps could have been important for planning of individual working procedures - with high probability it was possible to predict other measures of the intended construction, including lengths of wooden structural elements. Extraction of adequate trees had yet to take place out of the growing season, in the winter, and therefore, before the time suitable to the digging. Statics and strength of structures, did not constitute a problem. We think that according to ancient ideas it was not enough to work only within the economically determined limits, just reflecting the will of the implementer, randomly, depending on the instantaneous decision.

The real motivation of the builders has to be looked for elsewhere. The newly established feature had the importance for the another life, perhaps of one generation of users, it was therefore necessary to proceed so that all the steps, including the determination of dimensions, were executed in accordance with the rules applicable in the microworld of people at that time. The area layout using geometric measurements had a special meaning – to ensure compatibility of the new work with objectively existing, higher order valid in the natural world, which had been encoded in geometric patterns. The interest in the "ritual treatment" of the beginning of construction is demonstrated by building sacrifices, and the Moravian environment also has provided evidences of specific acts accompanying the end of the function of features [11]. One can assume that buildings, (or better to say their existence) occupied in the understanding of those people the same status as a person,

animals, plants, or selected movable properties. Therefore, the beginning and the end of their existence was accompanied by similar, improfan steps dictated by former rituals.

The existence of intentional use of measurements was in order to avoid of randomness verified on the example from another locality. The hut XIV uncovered during the research in Křepice [3] is characterized by an elongated ground plan and in this case a previously prepared scheme was successfully identified (Fig. 4). Preliminary analyzes performed on other ground plans of huts showed, that (except in situations for now without success) usage of various apparently distinct concepts can be identified. The huts with application of alternative processes occur more frequently than those where there was an application of the rules known to us. Generally shared principle was obviously varied by location, time, and with respect to yet unknown circumstances.

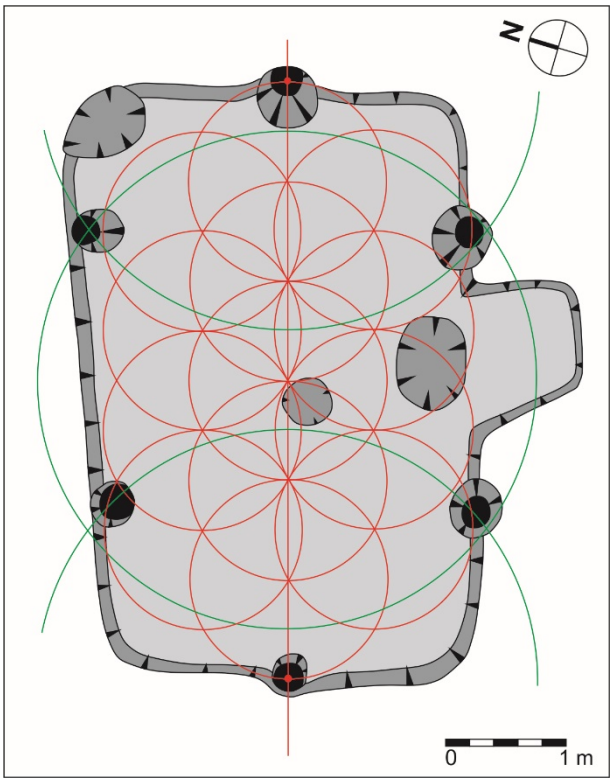

Fig. 4: The scheme used during stakeout points for the placement of postholes. Hut Křepice XIV.

In regions where people's lives continued genetically connected with the Germanic environment, there were documented building foundations where measurements were used - the houses at the settlement of Merovingian time in Bavarian Kirchheim (dated to the 7th century AD), had the lengths of the walls measured in feet with approximately rectangular crossing lines of vertical support stakes [1].

5 CONCLUSION

Material and spiritual culture of barbarians who were the creators of architecture studied by us, persisted farther during the Roman period. Its signs, however, are being lost at the beginning of the Migration period; so we cannot expect continuity of the former architecture. It could seem that from the perspective of the present the former architecture is meaningless. Application of such materials as wood or clay is not even today fully anachronic. We can also say that the countersink of some interiors to greater depths was important in terms of energy savings and allowed to achieve a comfortable microclimate, especially the optimum humidity and temperature, whether by us referred

huts served as the residential buildings or in them there were found the economic areas intended e.g. for storage of selected foods (eg. milk, dairy products, grain, the products modified from cereals through the fermentation process, or from vegetables with using the fermentation – e.g. fermented cabbage).

Nowadays in ensuring the appropriate parameters of buildings usually other materials are applied and in order to create good usable properties, architects prefer advanced technologies. This trend is ideologically conformist with approaches of architecture operated under the ancient and Roman world. The degree of complexity of local communities was significantly greater as compared to the situation which existed in barbaricum, in the Mediterranean region, except for technical and technological aspects, rational approach for planning and implementation of the construction work dominated. Thanks to the wide application of stone walling and bricks and due to the use of burnt roof covering significantly increased life expectancy of structures - it greatly exceeded the timeframe for the use of barbarian creations. Local, barbarian populations, however, they had another advantage - they were established with low technical, technological, material and energetical costs.

What is new is the discovery that with foundation of buildings of the barbarians in Moravia a particular importance had acts using quite complicated geometrical measurements. We can finally say, that people of that time had interest in quality working of projected buildings, chose appropriate venues for them, so that they served well to users, ensured the appropriate heat insulation and used the thermal inertia of building structures, in order to ensure a favourable climate in the interiors, and also applied the materials belonging to the category of renewable sources. The achievement of these goals is certainly not indifferent in the planning and implementation of structures in modern times.

REFERENCES

[1] DANNHEIMER, H. Baumasse einiger frühmittelalterlicher Gebäude aus Bayern. *Archäologisches Korrespondenzblatt*. 1985, 15, pp. 515-523. ISSN 0342-734X.

[2] DONAT, P. Langhäuser im östlichen Germanien. Überlegungen zu einem Forschongsproblem. *Slovenská archeológia*. 2001, 49, pp. 103-118. ISSN 1335-0102.

[3] DROBERJAR, E. *Studien zu den germanischen Siedlungen der älteren römischen Kaiserzeit in Mähren*. Praha : Národní muzeum - Fontes Archaeologici Pragenses 21, 1997. 378 pp. ISBN 80-7036-039-9.

[4] DROBERJAR, E. & PROSTŘEDNÍK, J. Turnov – Maštalkovy zahrady – germánský dvorec z 3. století. *Památky archeologické*. 2004, 95, pp. 31-106. ISSN 0031-0506.

[5] HAARNAGEL, W. *Die Grabung Feddersen Wierde. Methode, Hausbau-, Siedlungs- und Wirtsachaftform sowie Socialstruktur.* Wiesbaden : Steiner, 1979. 364 pp. ISBN 3-515-02511-1.

[6] KAŠPÁREK, F. Germánské sídliště z doby římské ve Slatinicích na Olomoucku. In *Barbarská sídliště: Chronologické, ekonomické a historické aspekty jejich vývoje ve světle nových archeologických výzkumů (Archeologie barbarů 2007)*. Brno : Archeologický ústav AV ČR Brno, v. v. i., 2008, pp. 177-200. ISBN 80-86023-89-3.

[7] KOLNÍK, T. Haus und Hof im quadischen Limesvorland. In *Haus und Hof im östlichen Germanien.* Bonn : Habelt, 1998, pp. 144-159. ISBN 3-7749-2795-2.

[8] KOMBER, J. O rekonstrukci pravěkých halových domů z technického pohledu. *Živá archeologie: (Re)konstrukce a experiment v archeologii.* 2008, 9, pp. 58-62. ISSN 1213-1628.

[9] KOSSACK, G. & BEHRE, K. E. & SCHMIDT, P. (Hrsg). *Archäologische und naturwissenschaftliche Untersuchungen an ländlichen und frühstädtischen Siedlungen in deutchen Küstengebiet vom 5. Jahrhundert v. Chr. Bis zum 11. Jahrhundert n. Chr*. 1st ed. Weinheim : Acta humaniora, 1984. 447 pp. ISBN 3-527-17005-7.

[10] LOBISSER, W. & STUPPNER, A. Zur Rekonstruction eines kaiserzeitlichen Wohnstallgebäudes in Elsarn im Strassenthal. *Archaeologie Österreichs*. 1998, 9/1, pp. 71-80. ISSN 1018-1857.

[11] NÝVLTOVÁ FIŠÁKOVÁ, M. & ŠEDO, O. Kostra kočky domácí v sídlištním objektu z doby římské v trati Žleby u Vyškova na Moravě. *Archeologické rozhledy*. 2003, 55, pp. 517-538. ISSN 0323-1267.

[12] PEŠKA, J. & TEJRAL, J. *Das germanische Königsgrab von Mušov in Mähren*. Mainz : Verlag des Römisch-Germanischen Zentralmuseums, 2002. 310 pp. ISBN 978-3-88467-076-7.

[13] PETERSEN, E. & VON DOMASZEWSKI, A. & CALDERINI, G. *Die Marcus-Säule auf der Piazza Colonna in Rom*. München : Bruckmann A. G., 1896. Tafeln I-LXIV. Bez ISBN.

[14] SCHUBERT, F. Zur Maß- und Entwurfslehre keltischer Holzbauten im oppidum Manching. Untersuchungen zu Grundrißtypen, Bauten und Baustrukturen. *Germania*. 1994, 72, pp. 133-192. ISSN 0016-8874.

[15] SKLENÁŘOVÁ, Z. Možnosti a problémy rekonstrukce pravěkých obytných staveb. *Živá archeologie: (Re)konstrukce a experiment v archeologii*. 2003, 4, pp. 11-39. ISSN: 1213-1628

[16] ŠEDO, O. Příspěvek k poznání germánských sídlišť doby římské na Moravě. In *Královská hrobka z Mušova. Barbaři a Římané nad středním Dunajem v prvních dvou stoletích nového letopočtu*. Mikulov : Regionální muzeum, 1991, pp. 22-28. ISBN 80-900-359-2-2.

[17] TEJRAL, J. Die Besonderheiten der germanischen Siedlungsentwicklung während der Kaiserzeit und frühen Völkerwanderungszeit in Mähren und ihr Niederschlag im archäologischen Befund. In *Haus und Hof im östlichen Germanien*. Bonn : Habelt, 1998, pp. 181-207. ISBN 3-7749-2795-2.

[18] TRIER, B. *Das Haus im Nordwesten der Germania libera*. Münster Westfalen : Aschendorff, 1969. 188 pp. ISBN 978-3402058428.

[19] TURČAN, V. Germánske sídliskové objekty na stĺpe Marca Aurelia. *Zborník Slovenského národného múzea – Archeológia*, 2014, Supplementum 8 - Stĺp Marca Aurelia a stredné Podunajsko, pp. 169-177. ISBN 978-80-8060-335-9.

[20] VARSIK, V. *Germánske osídlenie na východnom predpolí Bratislavy. Sídliská z doby rímskej v Bratislave-Trnávke a v okolí*. Nitra : Archeologický ústav SAV - Archaologia Slovaca Monographiae Fontes 18, 2011. 404 pp. ISBN 978-80-89315-34-5.

[21] ZEMAN, T. 1999: *Jihovýchodní Morava v době římské I-II*. Brno : Ústav archeologie a muzeologie filozofické fakulty Masarykovy univerzity, 1999. Diplomová práce, Masarykova univerzita, Filozofická fakulta, Ústav archeologie a muzeologie.

[22] ZIMMERNANN, W. H. *Die Siedlung des 1. bis 6. Jahrhunderts nach Christus von Flögeln-Eekhölten, Niedersachsen: Die Bauformen und ihre Funktionen. Probleme der Küstenforschung im südlichen Nordseegebiet 19*. Hildesheim : Verlag August Lax, 1992, 360 pp. ISSN 0343-7965. ISBN 3-7848-1319-4.